Geosyntec consultants

289 Great Road, Suite 105
Acton, Massachusetts 01720
PH 978.263.9588
FAX 978.263.9594
www.geosyntec.com

Memorandum

Date: 13 February 2014

To: Mr. Bruce Thompson, *de maximis, inc.*

From: Todd Creamer, David Adilman, Geosyntec Consultants, Inc.

Subject: Preemptive Vapor Intrusion Mitigation at 2250 Main Street
NMI Superfund Site, Concord, Massachusetts

This memorandum summarizes work completed in 2013 to implement vapor intrusion pathway mitigation at 2250 Main Street (the structure) in Concord, Massachusetts, off-property from the NMI Superfund Site. The 2013 phase of work is a follow-up to a study conducted by Geosyntec in 2009-2010 (*de maximis*, 2012) where outdoor air and two sub-slab soil gas locations were sampled in two seasons. Vapor intrusion investigation activities were conducted in November and December 2009, June 2010, August and December 2013, including building surveys, sub-slab soil gas sampling, high purge volume (HPV) sub-slab soil gas sampling, and outdoor air sampling. Data collected to date indicate that a complete vapor intrusion pathway from the sub-surface to indoor air is unlikely; however, as a protective measure Geosyntec installed a vapor intrusion mitigation system as proposed in a memorandum to *de maximis, inc.* dated 17 July 2013. The mitigation system was installed and activated on 29 August 2013 following collection of a sub-slab soil gas sample from the basement. An additional heating season sub-slab soil gas sample was collected on 17 December 2013 as presented in the July 2013 memorandum.

Vapor Intrusion Mitigation System

The structure already incorporated most elements of a radon-style sub-slab mitigation system including approximately one foot of compacted gravel beneath the slab, a horizontal perforated pipe buried within this gravel, and a nominal three-inch-diameter riser terminating in the attic. Mitigation system installation was completed on 29 August 2013 by Storch Radon Services, Inc. under contract to Geosyntec. The riser was extended to the exterior roof of the structure and a RadonAway™ model XP201 radon fan was installed in-line in the attic. A port was installed in the riser pipe on the basement level of the building to measure vacuum and verify flow. The approximate sub-slab piping configuration is indicated on Figure 1.

2013 Sub-Slab Soil Gas Sampling

Historical sub-slab sample results indicated that higher concentrations of TCE were observed in 2009 and 2010 at samples from location 2250SS-1; therefore, as a conservative measure, only location 2250SS-1 was sampled in 2013. In August 2013, a permanent sub-slab probe was installed at location 2250SS-1 comprising a 3/8-inch inner diameter brass pipe sealed into a hole drilled through the basement slab with quick-setting hydraulic cement. The top of the probe was fitted with a brass coupling and plug which allowed the probe to be sealed and installed at grade with the basement floor.

The cement was allowed to set for at least 30 minutes prior to sampling. Sub-slab sampling locations are presented on Figure 1.

One sub-slab soil gas sample was collected at 2250SS-1 on 29 August 2013 prior to mitigation system startup, and again on 17 December 2013. In December 2013, the fan connected to the mitigation system was deactivated approximately eight days prior to sample collection, and reactivated immediately after sample collection. Before sampling, the pressure differential between the sub-slab and the interior of the building was measured and recorded. Helium was used as a tracer during purging and field screening to verify that no significant amount of atmospheric air entered the sample through the annular seal between the floor slab and probe or through fittings in the sampling train. The helium concentration in the shroud and the field-screened soil gas was recorded with a model MGD 2002 Helium Detector to confirm that the screened soil gas contained less than 5% of the concentration of helium in the shroud. Sub-slab soil gas was purged using a Tedlar® bag and lung box. A lung box is an air-tight, hard-sided vessel with a flexible Tedlar® bag inside. The soil gas probe was connected to the bag through a length of inert tubing and soil gas was induced to enter the bag by partially evacuating air from inside the lung box and outside of the bag. Purged soil gas was field-screened using a PID, a LANDTEC GEM™2000 landfill gas meter with CH_4, O_2 and CO_2 sensors, and the helium detector. Three bag volumes (approximately 3 liters (L) total) were purged from the probe and screened with all three instruments on consecutive Tedlar® bag samples. Once field-screening measurements on successive bag samples had stabilized, the sampling train was isolated from the lung box and a sample was collected into a 6L SUMMA canister. Field activity forms are included in Attachment A.

Laboratory Analysis

Samples were shipped under chain-of-custody protocol via FedEx to Air Toxics Ltd. of Folsom, CA. The samples were analyzed for TCE by USEPA Method TO-15.

Results

Low concentrations of trichloroethene (TCE) were detected in five of six sub-slab soil gas samples ranging from 6.5 to 29 micrograms per cubic meter ($\mu g/m^3$), and generally declined from 2009 to 2013 (Table 1). The average concentration was 13.9 $\mu g/m^3$, including the reporting limit of 0.74 $\mu g/m^3$ for the non-detect sample. TCE was detected in the August sample from 2250SS-1 at a concentration of 7.9 $\mu g/m^3$ and was not detected in the December sample to a reporting limit of 0.74 $\mu g/m^3$. Sample results are summarized in Table 1; laboratory reports and data quality checklists are included in Attachment B.

Discussion and Recommendation

The appropriate screening level for TCE in sub-slab soil gas is the sub-slab soil gas vapor intrusion screening level (VISL) for a residential scenario from the external review draft of the OSWER Final [Vapor Intrusion] Guidance, Table 6-1 (USEPA, 2013). The VISL is 14.3 $\mu g/m^3$ and was calculated by dividing the USEPA Risk-Based Concentration (RBC) for residential indoor air (0.43 $\mu g/m^3$) by the medium-specific (i.e., sub-slab to indoor air) generic attenuation factor of 0.03.

The concentration of TCE measured in sub-slab soil gas has decreased from 2009 to 2013, following a trend similar to the concentrations of TCE measured in the nearby groundwater monitoring wells

OW-1 and MW-1 (Table 2). TCE concentrations in sub-slab soil gas were below the USEPA generic VISL when TCE concentrations in groundwater were in the range of 2-6 µg/L. TCE concentrations in groundwater are expected to continue a long-term decline and therefore the same declining trend is expected in soil gas.

Both the long-term average TCE concentration measured in sub-slab soil gas, 13.9 $\mu g/m^3$, and the most recent measurements at SS-1 in 2013, 7.9 $\mu g/m^3$ in August and non-detect (<0.74 $\mu g/m^3$) in December, are below the residential soil gas VISL. Based on these results, Geosyntec recommends advising the property owner of his option to deactivate the mitigation system fan after one more annual measurement of TCE in groundwater at MW-1 and OW-1 indicates groundwater concentrations similar to those detected in 2011, 2012 and 2013.

REFERENCES

de maximis, AMEC, Geosyntec, H&A, 2012. *Draft Remedial Investigation Report*. Nuclear Metals, Inc. Superfund Site, Concord, Massachusetts. November.

Geosyntec Consultants, 2013. *Scope of Work and Cost Estimate: Vapor Intrusion Mitigation at 2250 Main Street.* NMI Superfund Site, Concord, Massachusetts. 17 July.

United States Environmental Protection Agency, 2013. *OSWER Final Guidance for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Sources to Indoor Air (External Review Draft)*. April.

Attachments

Tables

Table 1. Summary of Soil Gas Analytical Results for TCE, 2009-2013, 2250 Main Street

Table 2. Summary of Groundwater Analytical Results for TCE, 2009-2013, 2250 Main Street

Figures

Figure 1. Lower Level Floor Plan, 2250 Main Street

Attachments

Attachment A. Field Sampling Forms

Attachment B. Laboratory Reports and Data Quality Checklists

TABLES

Table 1
Summary of Soil Gas Analytical Results for TCE, 2009-2013,
Nuclear Metals Superfund Site
2250 Main Street
Concord, MA

		2250SS-1	2250SS-1	2250SS-1	2250SS-1	2250SS-2	2250SS-2
Parameter	Units	11/22/2009	06/06/2010	8/29/2013	12/17/2013	11/22/2009	06/06/2010
Trichloroethene	µg/m3	29	20	7.9	< 0.74	19	6.5

< = less than laboratory reporting limit.

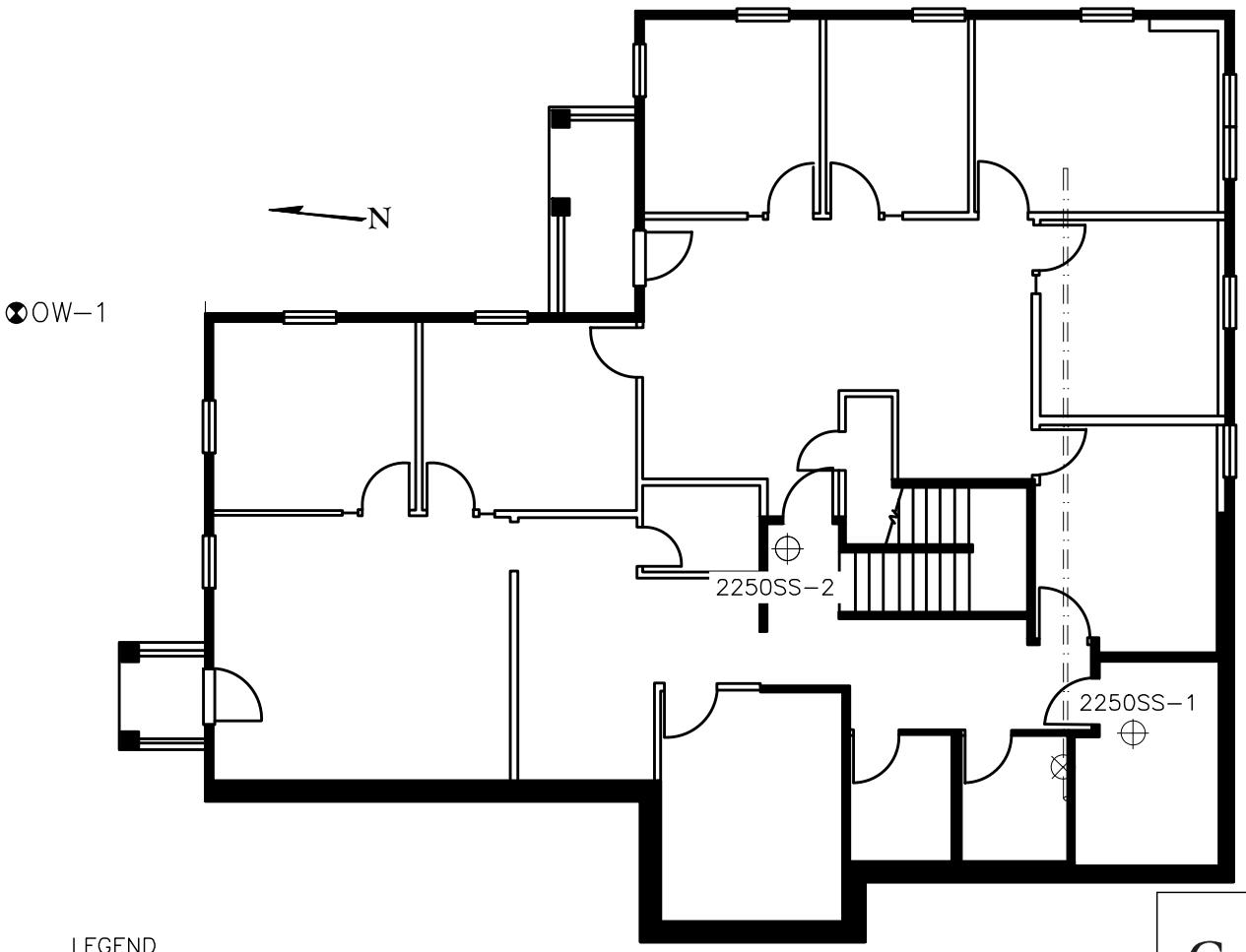
units are micrograms per cubic meter

Table 2
Summary of Groundwater Analytical Results for TCE, 2009-2013
Nuclear Metals Superfund Site
2250 Main Street
Concord, MA

		MW-1					OW-1				
Parameter	Units	11/6/2009	6/22/2010	6/28/2011	10/3/2012	8/5/2013	11/10/2009	6/23/2010	6/28/2011	10/2/2012	7/30/2013
Trichloroethene	µg/L	16.3	11.1	3.32	3.19	5.52	10.9	11.8	3	2.18	5.81

Results shown for monitoring wells GWRI16MW-1 and GWRI16OW-1
units are micrograms per liter

FIGURES



REV. 2014.02.06 2 MW's ADDED

LEGEND

- APPROXIMATE LOCATION OF 3 INCH RISER PIPE
- APPROXIMATE LOCATION OF SUB–SLAB RADON VENT PIPE
- 2250SS–1 SUB–SLAB SOIL GAS SAMPLING POINT
- MW–1 MONITORING WELL LOCATION

Geosyntec consultants

LOWER LEVEL FLOOR PLAN
2250 MAIN STREET
—
NUCLEAR METALS, INC.
CONCORD, MA

DATE:	04JUN13	SCALE:	1":12'
PROJECT NO.	BR0090	FILE NO.	FLOOR_PLANS_060413.DWG
DOCUMENT NO.	—	FIGURE NO.	1

T:\PROJECTS\1930 – REMEDIATION\BR0090 NMI_STARMET\CAD\FLOOR_PLANS_060413

ATTACHMENT A

FIELD SAMPLING FORMS

DAILY FIELD REPORT

Geosyntec consultants
289 Great Road
Acton, Massachusetts, 01720
(978) 263-9588 Fax (978) 263-9594

Project Name: NMI
Project Number: BR0090
Field Personnel: C. Martin, T. Creamen
Recorded By: C. Martin
Weather:

Date: 8/29/13
Page 1 of 1
Primary Activities: Sub slab sample test riser pipe connection

Time	Description of activities - location of work, work performed, equipment & personnel used, incidental information
7:15	C. Martin & T. Creamen on site
7:30	Kevin Hunley on site to open building - 2250 Main St.
8:15	Sub-slab probe installed in laundry room
	Check pressure: 0.000" H_2O at sub slab probe
8:45	Begin sampling protocol
0935	complete sampling, begin breakdown
0945	Stench on site
0955	Rooter on site
1015	hole Drilled in riser in ~~duct~~ ceiling above toilet in men's room, lower level
1020	Starch & CM to attic w/shop vac to test pneumatic connections between riser in attic, riser in men's room and 2250 SSP-1 probe
10:40	Vacuum measured at hole in riser with shop vac on. vac = 0.25" H_2O. Can hear shop vac running and can feel air moving in pipe. No measured pressure at Sub-Slab point after 5 minutes operation.
10:50	Todd Creamer off site
11:30	Fan installed, running. Stench off site.
	Rooter finishing work.
	Check sub slab probe pressure one more time, still zero. CSM off site with sample.
	CSM
16:45	CSM on site to install 1/4 inch plug in riser pipe in Men's restroom.
17:10	CSM off site

Daily Field Report/Jan. 99

SOIL GAS PROBE MEASUREMENTS

Laundry / utility room

Geosyntec consultants
www.geosyntec.com

① Project Name: NMI
Date: 29 August 2013 Project Number: BR0090
Site Location: West Concord, MA
Weather: overcast, still, humid 64°F
Field Personnel: C. Martin, T. Creamer
Recorded By: _____

Probe No.: SS2250-1 ☒ Sub-slab probe ☐ Soil gas probe
Mini Rae 2000 Serial No.: PPB Rae #250-104462 Lamp (10.6) / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M: US Env. GM09100107
MDG 2002 Helium detector Serial No.: _____
Tracer Gas: ☒ Helium ☐ Other _____

② Surface Type: ☐ Asphalt ☒ Concrete ☐ Grass ☐ Other _____
Surface Thickness ~15cm inches/centimeters ☐ Unknown
(i.e., asphalt or concrete)

③ 1 Casing Volume
☐ Sub-slab <0.1 L
Soil gas probe _____ (L)

⑤ Shut in test prior to pneumatic test completed, 18" in. H_2O held for 30 seconds, gauge board slow leak, sample train no leak

⑥ Start of Pneumatic Test: 0850

Elapsed Time (min.)	Pump Flow Rate (LPM)	Well Head Vacuum in. H_2O
	1.0 ~~0.1~~	0-15
	2.0 ~~0.2~~	bad gauge 0-5"
	5.0 ~~0.5~~	N/-2" on 0-100"

④ Initial Vacuum (prior to pumping) 0.000 in. H_2O

⑦ Field tubing blank reading (ppm_v) completed? ☐ Yes ☒ No PID Reading _____ ppm_v

⑧ Shut in test prior to purging completed? Yes ☒ No ☐ No change to setup

⑨ Purging

Date	Start Time	End Time	Elapsed Time (min.)	Bag Volume (L)	Purge Rate (LPM)	Cumulative Volume (L)	CH_4 (%)	CO_2 (%)	O_2 (%)	Tracer Gas Shroud (%) Min	Tracer Gas Shroud (%) Max	Tracer Gas Sample (ppm_v, %) (circle one)	VOCs by PID (ppm_v)
8/29/13	091230	091330	1.0	1.0	1.0	1.0	0.0	0.2	20.4	69.5	76.5	2600	73 ppb
	091900	092000	1.0	1.0	1.0	2.0	0.0	0.2	20.3	45.5	46.5	6400	45 ppb
	092300	092400	1.0	1.0	1.0	3.0	0.0	0.2	20.3	49.1	46.8	7575	52

⑩ Helium concentration in field screened samples is less than 5% of minimum concentration in the shroud? ☒ Yes ☐ No **Note:** 1% helium = 10,000 ppm_v

⑪ Shut in test prior to sample collection completed? Yes ☒ No ☐

⑫ Sample Collection

Date	Time	Sample ID	Summa Canister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum (in. Hg)	Final Vacuum (in. Hg)
08292013	0931	2250 SS-1-082913	1589	N/A filter only	Geo Ashcroft	29.61	3.75

Comments: background PID ~ 60 ppb 40 - 90 ppb
sample collected 0930 - 0931

SGP measurements - pneumatic testing.ai

METER CALIBRATION

Geosyntec consultants
geosyntec.com

Project Name: NMI Date: 8/29/2013 Recorded By: C. Martin Page 1 of 1

Project Number: BR0090 Weather: 65° overcast PrimaryActivities: Sub-Slab sampling

PIDs

Serial Number		Ambient Air (ppm)	~~100ppm~~ 10 ppm Isobutylene (ppm)
250-104462	Initial Time: 7:25	0.0 ppb	9642 ppb → 10 ppm
	Final Time: 11:20	40. ppb	9740 ppb
	Initial Time:		
	Final Time:		
	Initial Time:		
	Final Time:		
	Initial Time:		
	Final Time:		

GEMs

Serial Number		Ambient Air			Calibration Gas			Ambient Air		
		CH_4(%)	CO_2(%)	O_2(%)	CH_4(%)	CO_2(%)	O_2(%)	CH_4(%)	CO_2(%)	O_2(%)
GMD9/00907	Initial Time:	0.5	0.5	21.4	15.4	14.5	0.7			
0830 ↓	Final Time:	0.0	0.1	20.9	15.0	15.0	0.5			
0830	Initial Time:									
	Final Time:	0.0	0.1	20.9						
	Initial Time:									
	Final Time:									
	Initial Time:									
	Final Time:									

NOTES:

Personnel Signature: Claire Martin Date: 8/29/2013

Meter Calibration.ai

DAILY FIELD REPORT

Geosyntec
consultants
289 Great Road
Acton, Massachusetts, 01720
(978) 263-9588 Fax (978) 263-9594

Project Name: NMI
Project Number: BR0090A
Field Personnel: K. COGNAC & T. CREAMER
Recorded By: K. COGNAC
Weather: ~5° F outside ~70° F indoors @ sample location

Date: 12/17/13
Page 1 of 1
Primary Activities: SUB SLAB SAMPLING

Time	Description of activities - location of work, work performed, equipment & personnel used, incidental information
0700	K. COGNAC, T. CREAMER & K. HURLY (property owner)
	on site.
0702	H&S - slips/trips/falls on icy ground
0715	BEGIN COLLECTING SAMPLE @ 225055-1-12172013
0805	- pneumatic & leak testing complete
0810	collect sample - 2.5 mnutes to fill canister
0815	sampling complete - mobilize empolyees & equipment to vehicles
	Note: during sampling, did not see much Δ
	between sub slab & ambient readings
	BUT were fairly confident sample collected
	in canister was representative of
	subsurface/sub slab b/c
	ambient helium readings were
	an order of magnitude > than tedlar
	bag & ~~tets chamge~~ minimal Δ could
	be due to boell below freezing temperatures
0825	K. Cognac, T. Creamer & K. Hurley off site

METER CALIBRATION

Geosyntec consultants
geosyntec.com

Project Name: NMI
Project Number: BR0090A
Date: 12/10/13 and 12/17/13
Weather: 25° OVSK no rain
Recorded By: K. COGNAC
Primary Activities: INDOOR AIR SAMPLING / SUB SLAB
Page 1 of 1

PIDs

Serial Number		zero filter Ambient Air (ppm)	100ppm Isobutylene (ppm)
12/10/13 594-901184	Initial Time:	93 PPB	NA
	Final Time:	0 PPB	9840
12/17/13 250-102197 PPBRAE	Initial Time:	0 PPB	13.9 PPM
	Final Time:	0 PPB	10.0 PPM
↳ Cal check	Initial Time:		
	Final Time:	0	9196
	Initial Time:		
	Final Time:		

GEMs

Serial Number		Ambient Air			Calibration Gas			Ambient Air		
		CH_4(%)	CO_2(%)	O_2(%)	CH_4(%)	CO_2(%)	O_2(%)	CH_4(%)	CO_2(%)	O_2(%)
12/16 GM07305	Initial Time:	0.0	00.7	20.8	15.0 (14)	14.4	0.2			
	Final Time:	0.0	00.0	20.9	14.8	15.0	0.0			
12/17/13 GM12633	Initial Time:	1.0	00.7	21.4	38.5	28.9	0.0 21.4			
	Final Time:	0.0	00.7	20.9	50.0	25.0	20.9			
cal check	Initial Time:							kee		
	Final Time:	0.0	0.1	21.0	45.8	34.3	0.0			
	Initial Time:									
	Final Time:									

0625

0cm 2000+

NOTES:

Personnel Signature: _____ Date: 12/17/13

Meter Calibration.xl

SOIL GAS PROBE MEASUREMENTS

Geosyntec consultants

① Project Name: ~~2250 SS~~ Kel NM1
Date: 12/10/13 Project Number: BR0090A
Site Location: 2250 Main St. CONCORD, MA
Weather: ~5°F 70° indoors
Field Personnel: K. COGNAC
Recorded By: K. COGNAC

Probe No.: 2250SS-12102013 ☒ Sub-slab probe ☐ Soil gas probe
~~Mini Rae 2000~~ PPB 3000 Serial No.: 594-961184 (Kel) Lamp: 10.6 / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M: GM07305
MDG 2002 Helium detector Serial No.:
Tracer Gas: ☒ Helium ☐ Other

② Surface Type: ☐ Asphalt ☒ Concrete ☐ Grass ☐ Other
Surface Thickness _____ inches/centimeters ☐ Unknown (i.e., asphalt or concrete)

③ 1 Casing Volume
☒ Sub-slab <0.1 L
Soil gas probe _____ (L)

④ Initial Vacuum (prior to pumping) +.03 in. H_2O

⑤ Shut in test prior to pneumatic test completed, ___ in. H_2O held for ___ seconds.

⑥ Start of Pneumatic Test: 0740

Elapsed Time (min.)	Pump Flow Rate (LPM)	Well Head Vacuum in. H_2O
1.0 30s	~~0.1~~ 1LPM	~~.06~~ .03
1.5 45s	(Kel) ~~0.2~~ 2LPM	400 .06 1L
~~2.0~~ 60s	~~0.5~~ 4LPM	.09

⑦ Field tubing blank reading (ppm_v) completed? ☑ Yes ☐ No PID Reading 0.0 ppm_v

⑧ Shut in test prior to purging completed? Yes ☑ No ☐

⑨ Purging

Date	Start Time	End Time	Elapsed Time (min.)	Bag Volume (L)	Purge Rate (LPM)	Cumulative Volume (L)	CH_4 (%)	CO_2 (%)	O_2 (%)	Tracer Gas: Shroud (%) Min	Tracer Gas: Shroud (%) Max	Tracer Gas: Sample (ppm_v, %) (circle one)	VOCs by PID (ppm_v)	
12/17/13	0745	0747		1L	1,500mLPM	1.0	00.0	00.3	21.1	9.0	10.5	100 PPM	0.0	ambient Helium 100
	0748	0750		1L		2.0	00.0	00.2	21.0	9.1	9.0	325 PPM	0.0	250
	0755	0800		1L		3.0	00.0	00.2	21.0	9.5	11.5	500	0.0	425-550
	0802	0805		1L		4.0	00.0	00.1	21.1	9.5	9.5	675	0.0	550
AMBIENT							00.0	00.3	21.1					

⑩ Helium concentration in field screened samples is less than 5% of minimum concentration in the shroud? ☒ ~~Yes~~ ☐ No
Note: 1% helium = 10,000 ppm_v

⑪ Shut in test prior to sample collection completed? Yes ☒ No ☐

⑫ Sample Collection

Date	Time	Sample ID	Summa Canister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum (in. Hg)	Final Vacuum (in. Hg)
12/17/13	0810	2250SS-1-12172013	3114	—	—	-29.70	-1.57
	→ 2.5 min to fill						

Comments: record amount of time to fill can. Room of sample point reading 950 PPM Helium
ambient

SGP measurements : pneumatic testing.pdf

Indoor Air Sampling
Project: NMI

Geosyntec consultants

Location	Geosyntec SUMMA Canister Sample ID	Deployment Date	Deployment Time		Retrieval Date	Retrieval Time		Legnth of Sampling Period	Can ID	Regulator ID	Initial Field Pressure	Final Field Pressure	Comments
			Hour	Minute		Hour	Minute	~~Hours~~			"Hg	"Hg	
									31144		-29.92		~~[illegible]47~~
									96103				
225055	225055-1-121713	12/17/13	08	10	12/17/13	08	12	2.5min	31144	—	-29.70	-1.57	

ATTACHMENT B

LABORATORY REPORTS AND DATA QUALITY CHECKLISTS

eurofins | Air Toxics

9/10/2013
Mr. Chris Martin
GeoSyntec Consultants
289 Great Rd.
Suite 105
Acton MA 01720-4766

Project Name: NMI
Project #: BR0090
Workorder #: 1308713

Dear Mr. Chris Martin

The following report includes the data for the above referenced project for sample(s) received on 8/30/2013 at Air Toxics Ltd.

The data and associated QC analyzed by Modified TO-15 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Air Toxics Ltd. for your air analysis needs. Air Toxics Ltd. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Karen Stempson at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Karen Stempson

Project Manager

eurofins | Air Toxics

WORK ORDER #: 1308713

Work Order Summary

CLIENT:	Mr. Chris Martin GeoSyntec Consultants 289 Great Rd. Suite 105 Acton, MA 01720-4766	**BILL TO:**	Mr. Chris Martin GeoSyntec Consultants 289 Great Rd. Suite 105 Acton, MA 01720-4766
PHONE:	978-263-9588	**P.O. #**	BR0090A-16*6
FAX:		**PROJECT #**	BR0090 NMI
DATE RECEIVED:	08/30/2013	**CONTACT:**	Karen Stempson
DATE COMPLETED:	09/10/2013		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	2250SS-1-08292013	Modified TO-15	3.7 "Hg	5.1 psi
02A	Lab Blank	Modified TO-15	NA	NA
03A	CCV	Modified TO-15	NA	NA
04A	LCS	Modified TO-15	NA	NA
04AA	LCSD	Modified TO-15	NA	NA

CERTIFIED BY: Heidi Hayes DATE: 09/10/13

Technical Director

Certification numbers: AZ Licensure AZ0775, CA NELAP - 12282CA, NJ NELAP - CA016, NY NELAP - 11291, TX NELAP - T104704434-12-5, UT NELAP CA009332012-3, VA NELAP - 460197, WA NELAP - C935
Name of Accrediting Agency: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005, Effective date: 10/18/2012, Expiration date: 10/17/2013.
Eurofins Air Toxics Inc.. certifies that the test results contained in this report meet all requirements of the NELAC standards

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 9563
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
Modified TO-15
GeoSyntec Consultants
Workorder# 1308713

One 6 Liter Summa Canister (100% Certified) sample was received on August 30, 2013. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the full scan mode.

This workorder was independently validated prior to submittal using 'USEPA National Functional Guidelines' as generally applied to the analysis of volatile organic compounds in air. A rules-based, logic driven, independent validation engine was employed to assess completeness, evaluate pass/fail of relevant project quality control requirements and verification of all quantified amounts.

Method modifications taken to run these samples are summarized in the table below. Specific project requirements may over-ride the ATL modifications.

Requirement	***TO-15***	***ATL Modifications***
Initial Calibration	</=30% RSD with 2 compounds allowed out to < 40% RSD	</=30% RSD with 4 compounds allowed out to < 40% RSD
Blank and standards	Zero Air	UHP Nitrogen provides a higher purity gas matrix than zero air

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

There were no analytical discrepancies.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit, LOD, or MDL value. See data page for project specific U-flag definition.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

eurofins | Air Toxics

Summary of Detected Compounds
MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

Client Sample ID: 2250SS-1-08292013

Lab ID#: 1308713-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	0.15	1.5	0.82	7.9

eurofins | Air Toxics

Client Sample ID: 2250SS-1-08292013

Lab ID#: 1308713-01A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**c090508**	**Date of Collection: 8/29/13 9:31:00 AM**	
Dil. Factor:	**1.53**	**Date of Analysis: 9/5/13 02:19 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	0.15	1.5	0.82	7.9

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	118	70-130
Toluene-d8	104	70-130
4-Bromofluorobenzene	107	70-130

eurofins | Air Toxics

Client Sample ID: Lab Blank

Lab ID#: 1308713-02A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**c090505**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 9/5/13 11:14 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	0.10	Not Detected	0.54	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	99	70-130
Toluene-d8	108	70-130
4-Bromofluorobenzene	105	70-130

eurofins | Air Toxics

Client Sample ID: CCV

Lab ID#: 1308713-03A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**c090502**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 9/5/13 08:58 AM**	

Compound	%Recovery
Trichloroethene	113

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	104	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	110	70-130

eurofins | Air Toxics

Client Sample ID: LCS

Lab ID#: 1308713-04A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**c090503**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 9/5/13 09:45 AM**	

Compound	%Recovery	Method Limits
Trichloroethene	104	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	104	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	116	70-130

eurofins | Air Toxics

Client Sample ID: LCSD

Lab ID#: 1308713-04AA

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**c090504**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 9/5/13 10:20 AM**	

Compound	%Recovery	Method Limits
Trichloroethene	102	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	120	70-130

Air Toxics LTD.

CHAIN-OF-CUSTODY RECORD

Sample Transportation Notice
Relinquishing signature on this document indicates that sample is being shipped in compliance with all applicable local, State, Federal, national, and international laws, regulations and ordinances of any kind. Air Toxics Limited assumes no liability with respect to the collection, handling or shipping of these samples. Relinquishing signature also indicates agreement to hold harmless, defend, and indemnify Air Toxics Limited against any claim, demand, or action, of any kind, related to the collection, handling, or shipping of samples. D.O.T. Hotline (800) 467-4922

180 BLUE RAVINE ROAD, SUITE B
FOLSOM, CA 95630-4719
(916) 985-1000 FAX (916) 985-1020

Project Manager David Adelman

Collected by: (Print and Sign) Todd Creamer / Chris Manton

Company Geosyntec Consultants Email TCreamer@geosyntec.com

Address 289 Great Rd Ste 105 City Acton State MA Zip 01720

Phone 978-263-9588 Fax 978-263-9594

Project Info:
P.O. # BR0090A-16*6
Project # BR0090
Project Name NMI

Turn Around Time:
☑ Normal
☐ Rush
specify

Lab Use Only
Pressurized by:
Date:
Pressurization Gas: N_2 He

Lab I.D.	Field Sample I.D. (Location)	Can #	Date of Collection	Time of Collection	Analyses Requested	Canister Pressure/Vacuum Initial	Final	Receipt	Final (psi)
01A	225055-1-08292013	1589	8/29/2013	9:31	TO-15	29.61	3.75		

Relinquished by: (signature) Date/Time: [signature] 8/29/13 16:15
Received by: (signature) Date/Time: FedEx Tracking # 796579570404

Relinquished by: (signature) Date/Time:
Received by: (signature) Date/Time: Kathe Decker ATL 08/30/13 1030

Relinquished by: (signature) Date/Time:
Received by: (signature) Date/Time:

Notes:
TO-15 analysis for TCE only

Lab Use Only	Shipper Name	Air Bill #	Temp (°C)	Condition	Custody Seals Intact?	Work Order #
	FedEx		NA	good	Yes No (None)	1308713

Form 1293 rev.11

Initial Data Review Checklist
Level 1

Geosyntec consultants

Reviewed by:	C. Martin	Review Date:	September 16, 2013
Project/Task No:	BR0090A		
Sample Description:	2250 Main St Sub-Slab Sample		
Site:	NMI		
Laboratory	Air Toxics	Sample Date:	August 29, 2013
Laboratory Report #	1308713	Report Date:	September 10, 2013

Answer all questions "Yes" or "No". Any answer in a box requires comment

	Review Item	YES	NO	DESCRIPTION	USABLE (Y/N)?	DATA USABILITY COMMENTS
1	Chain-of-custody correctly completed:	X			Y	
2	Transcription errors in chain-of-custody, field forms, or lab reports:		X		Y	
3	All data requested received:	X			Y	
4	All analyses within holding times:	X			Y	
5	Compounds detected below reporting limit:		X		Y	
6	Surrogates within control for each sample:	X			Y	
7	Reporting Limits elevated by greater than 10X:		X		Y	
8	Matrix Spike/Matrix Spike Duplicate (MS/MSD) within recovery control limits:			N/A		
9	Relative percent difference (RPD) within control limits based on MS/MSD results:			N/A		
10	Laboratory Control Sample (LCS) within control limits:	X			Y	
11	Continuing Calibration Verification (CCV) within control limits:	X			Y	
12	Constituents detected above reporting limits in field equipment, trip or method blank samples:		X		Y	
13	Any laboratory qualifiers applied to data:		X		Y	
14	Laboratory corrective actions implemented:		X		Y	
15	Electronic Data Deliverable (EDD) received:	X			Y	
16	EDD checked against hard copy:	X			Y	
17	EDD ready for upload:	X			Y	
18	Further validation required:		X		Y	

Comments:

eurofins | Air Toxics

1/7/2014
Mr. Chris Martin
GeoSyntec Consultants
289 Great Rd.
Suite 105
Acton MA 01720-4766

Project Name: NMI
Project #: BR0090A
Workorder #: 1312380

Dear Mr. Chris Martin

The following report includes the data for the above referenced project for sample(s) received on 12/20/2013 at Air Toxics Ltd.

The data and associated QC analyzed by Modified TO-15 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Air Toxics Ltd. for your air analysis needs. Air Toxics Ltd. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Karen Stempson at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Karen Stempson

Project Manager

eurofins | Air Toxics

WORK ORDER #: 1312380

Work Order Summary

CLIENT:	Mr. Chris Martin GeoSyntec Consultants 289 Great Rd. Suite 105 Acton, MA 01720-4766	**BILL TO:**	Mr. Chris Martin GeoSyntec Consultants 289 Great Rd. Suite 105 Acton, MA 01720-4766
PHONE:	978-263-9588	**P.O. #**	BR0090A-16*6
FAX:		**PROJECT #**	BR0090A NMI
DATE RECEIVED:	12/20/2013	**CONTACT:**	Karen Stempson
DATE COMPLETED:	01/07/2014		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	2250SS-1-12172013	Modified TO-15	0.8 "Hg	5.1 psi
02A	Lab Blank	Modified TO-15	NA	NA
03A	CCV	Modified TO-15	NA	NA
04A	LCS	Modified TO-15	NA	NA
04AA	LCSD	Modified TO-15	NA	NA

CERTIFIED BY: Heidi Hayes DATE: 01/07/14

Technical Director

Certification numbers: AZ Licensure AZ0775, CA NELAP - 12282CA, NJ NELAP - CA016, NY NELAP - 11291, TX NELAP - T104704434-13-6, UT NELAP CA009332013-4, VA NELAP - 460197, WA NELAP - C935
Name of Accrediting Agency: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005, Effective date: 10/18/2013, Expiration date: 10/17/2014.
Eurofins Air Toxics Inc.. certifies that the test results contained in this report meet all requirements of the NELAC standards

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 9563
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
Modified TO-15
GeoSyntec Consultants
Workorder# 1312380

One 6 Liter Summa Canister (100% Certified) sample was received on December 20, 2013. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the full scan mode.

This workorder was independently validated prior to submittal using 'USEPA National Functional Guidelines' as generally applied to the analysis of volatile organic compounds in air. A rules-based, logic driven, independent validation engine was employed to assess completeness, evaluate pass/fail of relevant project quality control requirements and verification of all quantified amounts.

Method modifications taken to run these samples are summarized in the table below. Specific project requirements may over-ride the ATL modifications.

Requirement	***TO-15***	***ATL Modifications***
Initial Calibration	</=30% RSD with 2 compounds allowed out to < 40% RSD	</=30% RSD with 4 compounds allowed out to < 40% RSD
Blank and standards	Zero Air	UHP Nitrogen provides a higher purity gas matrix than zero air

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

There were no analytical discrepancies.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit, LOD, or MDL value. See data page for project specific U-flag definition.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

eurofins | Air Toxics

Summary of Detected Compounds
MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

Client Sample ID: 2250SS-1-12172013

Lab ID#: 1312380-01A

No Detections Were Found.

eurofins | Air Toxics

Client Sample ID: 2250SS-1-12172013

Lab ID#: 1312380-01A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a122313**	**Date of Collection: 12/17/13 8:17:00 AM**	
Dil. Factor:	**1.38**	**Date of Analysis: 12/23/13 06:43 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	0.14	Not Detected	0.74	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	103	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	97	70-130

eurofins | Air Toxics

Client Sample ID: Lab Blank

Lab ID#: 1312380-02A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a122305**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 12/23/13 11:33 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	0.10	Not Detected	0.54	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	98	70-130

eurofins | Air Toxics

Client Sample ID: CCV

Lab ID#: 1312380-03A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a122302**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 12/23/13 09:20 AM**	

Compound	**%Recovery**
Trichloroethene	86

Container Type: NA - Not Applicable

Surrogates	**%Recovery**	**Method Limits**
1,2-Dichloroethane-d4	96	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	102	70-130

eurofins | Air Toxics

Client Sample ID: LCS

Lab ID#: 1312380-04A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a122303**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 12/23/13 10:04 AM**	

Compound	%Recovery	Method Limits
Trichloroethene	111	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	88	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	103	70-130

eurofins | Air Toxics

Client Sample ID: LCSD

Lab ID#: 1312380-04AA

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a122304**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 12/23/13 10:40 AM**	

Compound	%Recovery	Method Limits
Trichloroethene	114	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	124	70-130
Toluene-d8	105	70-130
4-Bromofluorobenzene	100	70-130

eurofins | Air Toxics

Sample Transportation Notice
Relinquishing signature on this document indicates that sample is being shipped in compliance with all applicable local, State, Federal, national, and international laws, regulations and ordinances of any kind. Air Toxics Limited assumes no liability with respect to the collection, handling or shipping of these samples. Relinquishing signature also indicates agreement to hold harmless, defend, and indemnify Air Toxics Limited against any claim, demand, or action, of any kind, related to the collection, handling, or shipping of samples. D.O.T. Hotline (800) 467-4922

180 BLUE RAVINE ROAD, SUITE B
FOLSOM, CA 95630-4719
(916) 985-1000 FAX (916) 985-1020

Project Manager TODD CREAMER

Collected by: (Print and Sign) KRISTEN COGNAC

Company GEOSYNTEC Email TCREAMER@GEOSYNTEC.COM

Address 289 GREAT RD. SUITE 105 City ACTON State MA Zip 01720

Phone 978 263 9558 Fax 978 263 9594

Project Info:
P.O. # BR0090A -16*6
Project # BR0090A
Project Name NM1

Turn Around Time:
☒ Normal
☐ Rush
specify

Lab Use Only
Pressurized by:
Date:
Pressurization Gas: N_2 He

Lab I.D.	Field Sample I.D. (Location)	Can #	Date of Collection	Time of Collection	Analyses Requested	Canister Pressure/Vacuum Initial	Final	Receipt	Final (psi)
01A	225055-1-12172013	31144	12/17/13	0810-0812	TO-15 *	-29.70	-1.57		
	—	96103	—	—	DO NOT ANALYZE / not used	—	—		

Relinquished by: (signature) Date/Time 12/17/13 @ 1010
Received by: (signature) Date/Time Tracking # FEDEX 797425683915

Relinquished by: (signature) Date/Time
Received by: (signature) Date/Time 12.20.13 1245

Relinquished by: (signature) Date/Time
Received by: (signature) Date/Time

Notes:
*TCE only

Lab Use Only	Shipper Name	Air Bill #	Temp (°C)	Condition	Custody Seals Intact?	Work Order #
	FedEx		NA	Good	Yes No None	1312380

Form 1293 rev.11

Geosyntec consultants

Data Validation Checklist
Level 1

Reviewed by: Kristen Cognac
Project/Task No: BR0090A-16*6
Review Date: 1/15/2014

	YES	NO
ATTACHED TO THIS FORM: 1) DATA REPORT COVER SHEETS		
2) LABORATORY NARRATIVE:		

Site: NMI - Hurley VI
Laboratory Report # 1312380
Sample Date: 12/20/2013
Report Date: 1/7/2014

Answer all questions "Yes" or "No". Any answer in a box requires commen

Review Item	YES	NO	COMMENTS
Chain-of-custody correctly completed:	X		
Transcription errors in chain-of-custody, field forms, or lab reports.		X	
All data requested received:	X		Only TO-15 TCE requested and received.
All analyses within holding times:	X		
Compounds detected below reporting limit:		X	
Surrogates within control for each sample:	X		
Reporting Limits Elevated by greater than 10X:		X	
Matrix Spike/Matrix Spike Duplicate (MS/MSD) within recovery control limits	n/a		
Relative percent difference (RPD) within control limits based on MS/MSD results:	n/a		
Laboratory Control Sample (LCS) within control limits:	X		
Continuing Calibration Verification (CCV) within control limits:	X		
Constituents detected above reporting limits in field equipment, travel or method blank samples:		X	Passed helium leak test in field as well.
Any laboratory qualifiers applied to data:		X	
Laboratory corrective actions implemented:		X	
Are data acceptable quality:	X		
EDD received:	X		
EDD checked against hard copy:	X		
EDD ready for upload:	X		
Further Validation required:		X	

Comments: field form final vacuum = -1.57 "hg. Lab Receipt vacuum 0.8 "hg